

MODULAR ELECTRIC TOOTHBRUSHES

JOHN GEOFFREY CHAN

CROSS REFERENCE TO RELATED APPLICATION

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RC This application is a continuation-in-part of Application No. 10/274,700 filed on October 21, 2002, <sup>now abandoned</sup> which claims priority to U.S. Provisional Applications Serial No. 60/387,841 filed June 11, 2002; Serial No. 60/410,865 filed September 13, 2002; and Serial No. 60/410,556 filed September 13, 2002 all of which are herein incorporated by reference.

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FIELD OF THE INVENTION

The present invention relates to electric toothbrushes and more particularly, modular electric toothbrushes having interchangeable or replaceable components and electric toothbrushes having high efficiency.

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BACKGROUND OF THE INVENTION

The present invention relates generally to electric toothbrushes. More particularly, it relates to an improved electric toothbrush with replaceable or exchangeable movable and/or static bristle carriers. Although many different electric toothbrushes exist which offer different advantages and characteristics, these characteristics can increase the costs associated with the toothbrush and can be reflected in higher retail prices for the product. Accordingly, it would be desirable to provide an electric toothbrush that was relatively inexpensive to assemble and produce, but provides the cleaning efficacy and toothbrush characteristics desired by the consumer.

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Electric toothbrushes are also known in which certain components of the brush may be interchanged or replaced with like components from other toothbrushes or components that are sold separately. For example, toothbrushes having replaceable head and neck assemblies are known in which the entire head and at least a portion of the neck may be removed from a toothbrush body or its housing, and replaced with another head and neck assembly. U.S. Application No. 09/850,662 teaches an electric toothbrush having a replaceable brush head.

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mechanism that provides a shaft that rotates. Furthermore, it will be appreciated that other motor and reciprocating or rotating shaft arrangements can be substituted. For example, US Patent Nos. 5,226,206; 5,524,312; 5,383,242; 5,465,444; 5,504,959; 5,836,030; 4,845,795; 5,404,608; 5,359,747; and 5,617,601, the substances of which are incorporated herein by reference, disclose  
 5 other motor and reciprocating shaft arrangements that might be suitable. In addition, the electric toothbrush of Fig. 9 might be provided with a replaceable head. A suitable arrangement which can be adapted to the present invention is disclosed in US Application Ser. No. 09/850,662, filed May 7, 2001, <sup>now U.S. Pat. No. 6,836,917</sup> the substance of which is incorporated herein by reference. Similarly, the drive mechanisms disclosed in U.S. applications Serial Nos. 10/114,780 filed April 3, 2002; and <sup>now abandoned</sup> 10/128,018 filed April 22, 2002, <sup>now abandoned</sup> both of which are herein incorporated by reference, are also  
 10 contemplated for use in conjunction with the present invention.

Another preferred embodiment toothbrush using a reciprocating drive shaft is illustrated in Fig. 12. Fig. 12 illustrates an electric toothbrush 800 comprising a toothbrush head 820, a body or handle 830, and an elongated neck 840 extending therebetween. The drive train, which  
 15 includes various shafts and gears that transmit motion from a motor to an inner bristle carrier 852 is similar to that described in US Patent No. 6,178,579, the substance of which is incorporated herein by reference. The handle 830 is hollow and includes a motor 802 and batteries (not shown) for powering the motor. In one embodiment of the invention the toothbrush comprises a power source of one battery. In another embodiment of the invention the toothbrush comprises a power  
 20 source of two batteries. A rechargeable power source can be substituted for the batteries. The batteries can connect the motor via a wire, a metal strip, direct contact, and/or any combination thereof. The head 820 has a longitudinal axis extending therethrough. The longitudinal axis extends in the same general longitudinal direction as a longitudinal axis of the shaft 860. The inner bristle carrier 852 is disposed along the head 820, wherein the end 822 is at the distal-most  
 25 point of the head 820. Although the inner bristle carrier 852 is preferably oval in shape, other shapes can be utilized. Further, while the inner bristle carrier 852 is disposed proximate the end 822 of the head 820, it will be appreciated that the carrier 852 can be disposed away from the end 822 and other features, such as static bristles, can be disposed around at least a portion of the perimeter of the inner bristle carrier 852. In this embodiment, the inner bristle carrier 852 only  
 30 reciprocates and does not oscillate, or perform any other rotational or oscillatory motion.

A first gear 804 is operatively connected to and powered by the motor 802. A second gear 806 is operatively connected to the first gear 804. The rotational axis of the second gear 806 is approximately normal to the rotational axis of the first gear 804 such that the teeth of the first gear 804 mesh with teeth of the second gear 806, thus causing the second gear 806 to rotate as the  
 35 first gear 804 rotates.

same channel. In the alternative the surface of the receiving member can be formed into a rail to guide the bristle carriers into place. In addition to the channel and rail assembly used to guide the bristle carriers onto the receiving member, other assemblies may be used to retain the bristle carriers on the receiving member. In one embodiment the bristle carriers are retained on the receiving member of the toothbrush by connectors defined by the outer surface of the receiving member, matable with connectors defined by the inner surface of the static bristle carriers. Such connectors include, but are not limited to, serrations and teeth, indentations and tabs, and grooves and protuberances. In one embodiment of the toothbrush the connectors are one or more retaining grooves defined along the inner surfaces of the static bristle carriers, and protuberances defined along the outer surface of the receiving member 1417 wherein the protuberances reside in the grooves to secure the static bristle carriers on the receiving member. In another embodiment, (not shown), the protuberances are defined along the inner surface of the static bristle carriers, and the grooves are defined along the outer surface of the receiving member, wherein the protuberances reside in the grooves to secure the static bristle carriers. The bristle carriers can also engage the receiving member with a snap type engagement (not shown). In another embodiment the one or more static carrier(s) and/or the one or more movable carrier(s) engage the receiving member with a flexible tongue having a latch hook and a corresponding locking undercut or recess in the opposite attachment part as disclosed in U.S. Application 10/361,653, <sup>now pending</sup>

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When the one or more movable bristle carrier(s) are nested within the static bristle carrier(s), the rail of the movable bristle carrier(s) can extend below the static bristle carrier(s), so that the rail of the movable bristle carrier(s) can engage the receiving member of the toothbrush. When the nested bristle carrier(s) engage the receiving member, the movable bristle carrier(s) can be disposed in the middle and/or center of the head of the toothbrush.

In another embodiment of the invention the nested arrangement occurs only once all the bristle carriers engage the receiving member (not shown). In this embodiment a portion of the receiving member comprises static bristles permanently affixed directly onto the surface of the receiving member. The movable bristle carrier(s) can be substantially surrounded by static bristles when a receiving member provided with bristles, receives one or more movable bristle carrier(s) and then one or more static bristle carrier(s).

The movable bristle carrier(s) is also operatively engaged to the motor. This operative engagement can be achieved by connecting the bristle carrier(s) to a drive shaft that extends through a passage 1428 defined within a portion of the neck 1440 and receiving member 1431. The drive shaft may be rotatably or slidingly disposed within the passage 1428. Once the brush head is formed by the engagement of the bristle carriers to the receiving member, the passage 1428 provides access between the brush head 1421, the neck 1440, and the interior of the body